

From: Figur, Charles [Figur.Charles@epa.gov]
Sent: 1/29/2014 8:10:23 PM
Subject: TCLP, LEAF and CCA

Very interesting.

Daily News

Coal Ash Reuse Tests Mark Early Application Of New EPA Leaching Model

Posted: January 29, 2014

A pair of recently published studies that found limited leaching potential of concrete containing coal ash mark one of the first uses of new test methods, recently approved by EPA's waste office, for assessing whether waste material and other substances leach toxics and are eligible for regulation under the Resource Conservation & Recovery Act (RCRA).

The new protocol -- known as the Leaching Environmental Assessment Framework (LEAF) -- was developed in part due to concerns with the leaching test method EPA currently uses to make waste decisions, called the toxicity characteristic leachate procedure (TCLP), which has long drawn criticism from EPA advisors and stakeholders on all sides for inaccurately characterizing waste materials' leaching potential.

EPA certified the components of the new protocol between October 2012 and January 2013, adding it to its publication *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. The document is the waste office's analytical and sampling methods guidance, known as SW-846.

TCLP, which is one of dozens of test methods in SW-486, is used to determine whether non-listed wastes exhibit toxic characteristics -- one of four criteria EPA can use to regulate non-listed wastes under RCRA.

Agency officials have been working for years to improve TCLP, the most commonly used test for determining whether hazardous constituents leach from waste material. Industry and environmentalists alike have criticized TCLP, arguing that it overestimates or underestimates potential risks.

The agency lost two lawsuits in the 1990s over the test, with the U.S. Court of Appeals for the District of Columbia Circuit describing a use of TCLP as "inaccurate" in its 1998 ruling in *Columbia Falls Aluminum Co. v EPA*. A year later, EPA's Science Advisory Board (SAB) urged the agency to improve the leaching test, saying TCLP -- designed to test for toxic leaching in a municipal solid waste landfill -- is applied too broadly and may overestimate or underestimate leaching potential. SAB called on EPA to "improve leach test procedures, validate them in the field, and then implement them," in a 1999 letter to then-Administrator Carol Browner. The National Academy of Sciences (NAS) has also criticized the method.

In response, EPA worked with Vanderbilt University professors and others to develop LEAF, which is designed to better replicate leaching that would occur in the natural environment when solid material is exposed to varying weather conditions and acid rain, rather than a lined landfill environment. The test is also specifically designed to test coal ash that is becoming more toxic as a result of strengthened air pollution controls at power plants.

This feature is especially important as EPA has stepped up regulation of power plants and other facilities' air emissions, which has resulted in increased toxicity in coal ash and other environmental releases from the facilities, and as it weighs stricter disposal rules for the ash, which are expected to encourage increased reuse of the material in concrete gypsum and other beneficial reuse applications.

EPA is slated Jan. 29 to unveil a settlement with coal ash recyclers, environmentalists and others that will set a year-end deadline for when it will complete its long-awaited disposal rule, which is expected to adopt flexible RCRA subtitle D rules, regulating the material as a "solid waste."

While the new method will help EPA assess the leaching potential of products containing coal ash, the agency has said it will limit its use to determine whether a planned beneficial reuse is likely to leach contaminants at a particular site and will continue to use TCLP to determine whether a leaching waste is hazardous.

***Chemosphere* Papers**

In the recent papers, funded jointly by EPA and the Electric Power Research Institute (EPRI), the researchers used the new LEAF approach to test samples of concrete -- prepared like those used in U.S. commercial and residential applications -- with and without fly ash and detected no difference in leachates between the different samples. Among the first paper's highlights is the conclusion that "fly ash replacement causes minimal to no increases in leaching from [concrete] monoliths."

Chemosphere published the first study, "Effect of coal combustion fly ash use in concrete on the mass transport release of constituents of potential concern," Dec. 19. It's authors include Andrew Garrabrants and David Kosson of Vanderbilt University. The second study, "pH-dependent leaching of constituents of potential concern from concrete materials containing coal combustion fly ash," was also published Dec. 19.

The studies are bolstering coal ash recyclers, who hope the findings together with EPA's upcoming disposal rule, will provide them with a much needed boost. They hope the studies will allow the agency to provide more regulatory certainty to an industry that has been undermined in part by concerns over how strictly the agency would regulate ash disposal.

Kosson, who together with his colleagues was also involved with EPA in the development of LEAF, used the new methods to test leachate from the concrete samples developed to compare concrete with and without fly ash. They note that SAB in the 1990s "cautioned that TCLP (i) provides little relevant information for concrete assessment because the test conditions are not applicable to highly alkaline monolithic materials, (ii) the municipal solid waste disposal scenario simulated by the TCLP test condition is not indicative of actual use conditions and (iii) single-batch tests performed on side-reduced materials do no account for the monolithic nature of concrete materials."

By contrast, the authors write the LEAF approach, which includes four different tests, is "more appropriate for beneficial use evaluations in that method selection is based on material properties, fundamental leaching mechanisms, and the conditions of the anticipated utilization or disposal scenario."

One coal ash management source says that while recyclers oppose LEAF's use for regulatory decisions, "LEAF is not a bad tool. It's designed for development of a remediation plan at a site where there is a problem, so that you can approximate the situation. That's a perfectly appropriate use of LEAF. But the environmentalists want to use it to replace TCLP."

A second source says that LEAF's flexibility means that it could be manipulated, for example, by tweaking the pH of the site conditions to make them extremely acidic or extremely basic. "You can make the test so you can get what you want," the source says.

Still, whether LEAF should replace TCLP in regulatory decision-making remains a debated question. The ash management sources argue that LEAF's flexibility, which allows assessors to create a specific testing scenario based on the type of material under review and where it will be recycled or dumped, can also be manipulated to result in overly harsh assessments.

The *Chemosphere* journal articles lead the coal ash management sources to expect that EPA's reviews of recycling of fly ash in concrete and coal combustion production gypsum in wallboard will be positive. They note that in doing so, the authors created the most conservative risk assumptions in performing the LEAF testing.

But while their products are vindicated in these tests, other products might not see similar results under the LEAF testing. The sources hope that the positive reviews of LEAF in the *Chemosphere* paper will not bolster its chances for replacing TCLP.

Ken Ladwig, a senior technical leader at EPRI, a partial funder of the research, suggests that LEAF might be too complicated for regulatory use. "LEAF generates lots of data -- TCLP is one data point. LEAF is much

more involved and complicated," Ladwig said. "Replacing TCLP with [LEAF] would be much more difficult." --
Maria Hegstad (mhegstad@iwpnews.com This e-mail address is being protected from spambots. You need JavaScript enabled to view it)